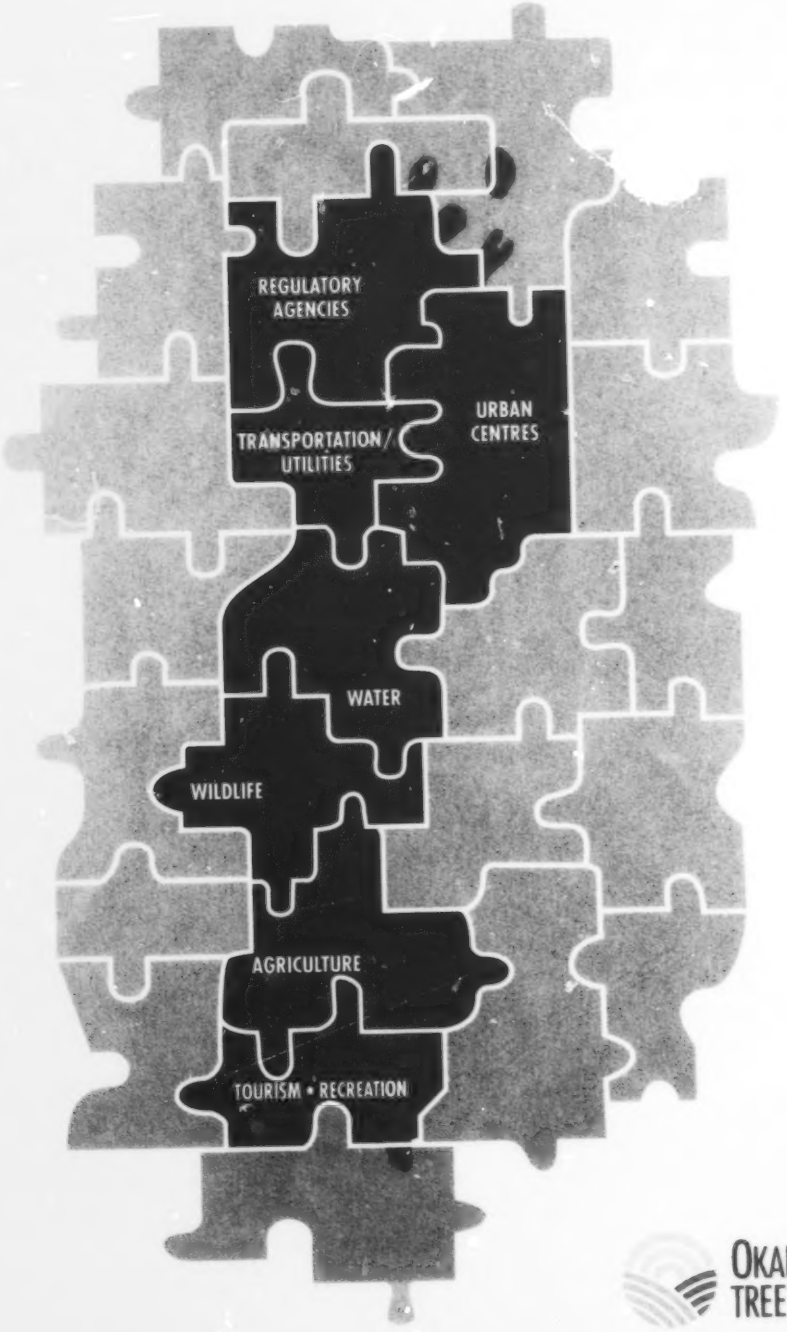
TREE FRUIT INDUSTRY

LAND AND WATER USE ISSUES

Discussion Paper

October, 1992



OKANAGAN VALLEY
TREE FRUIT AUTHORITY

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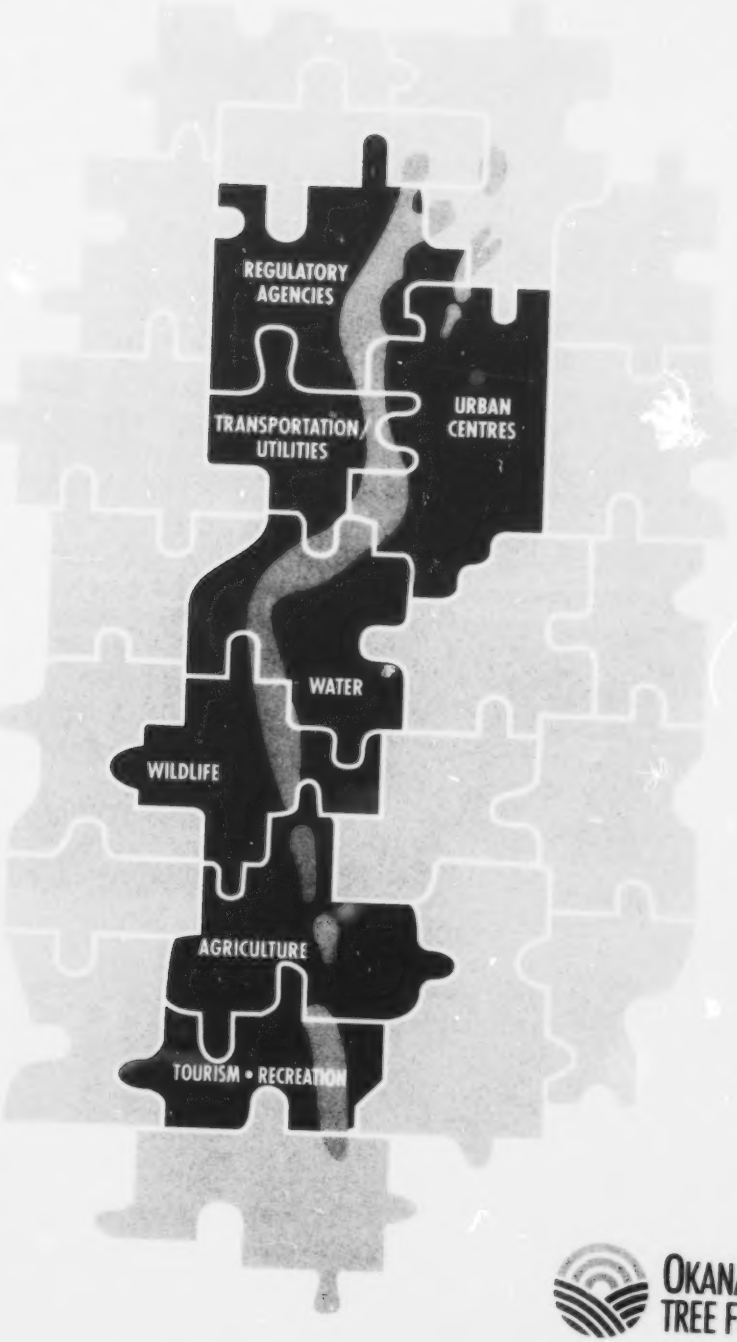

OKANAGAN VALLEY TREE FRUIT AUTHORITY

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Preamble

British Columbia's Southern Interior is one of only four small areas of Canada capable of supporting significant commercial orchards. The others are Southern Ontario, the St. Lawrence River Valley, Quebec, and the Annapolis Valley, Nova Scotia. Since 1900, the tree fruit industry has been one of the cornerstones of the Southern Interior's economy and a strong influence on the lifestyle in the Okanagan, Similkameen, and Creston Valleys. Until the 1960's, the economy of the Valleys was based on fruit growing, ranching, logging, and tourism. The region's unique combination of climate, soils, and terrain constitutes a resource unequalled anywhere else in the world for production of certain types of tree fruits.

Over the past 20 years, increased competition from other countries, a glut of apples on world markets, and increasing pressures for urban development have reduced the strength of the orchard industry. The past ten years have seen increased costs of production and decreased returns, both serious threats to the long-term outlook for the industry.

Despite these difficulties, all is not black. Most orchardists who have replanted to high-demand varieties at higher densities are obtaining returns substantially greater than the industry's average, and orchards continue to contribute significantly to the local economy. The farmgate value of tree fruits is over $50 million and tourism has increased dramatically in the past 20 years. The latter benefits the orchard industry through increased roadside stand sales and from the aesthetic attraction of the orchards.

Along with the rural lifestyle, the tree fruit industry and other agricultural activities offer distinct social values to the local area and the Province.

- a nutritious, diverse, and secure food source at reasonable prices and produce with high capability for value-added products;
- steady employment for people in the area: about 7500 permanent jobs in the Okanagan-Similkameen-Kootenay areas and another 1000 seasonal jobs ;
- a stable community base because of the renewable nature of agriculture compared to other resource industries.

The first apple trees were planted at the Pandosy Mission near Kelowna in 1862 and in the Similkameen and Penticton areas by 1870. Commercial orcharding started with plantings at Coldstream Ranch near Vernon and the Guisachan Ranch near Kelowna in 1882.

In the next two decades, promotion by the province and the CP Railway led to expanded settlement, development of large areas as orchards, and the creation

of an irrigation system of open flumes. By 1911, the area became B.C.'s leading orchard region. The federal research station was established at Summerland in 1914.

From the beginning, water has been one of the main limiting factors for tree fruits in this semi-arid climate. The North Okanagan was the most popular for tree fruits until after World War I chiefly because of readily available water. In 1919, however, the government bought and subdivided 8,900 ha of arid land along the Okanagan River for returning soldiers and built a permanent irrigation canal and system from Oliver to Osoyoos. This opened up the southern valley to orchards; by 1940, the South Okanagan had 75% as many fruit trees as the North.

The expansion continued after World War II with further development of lands for veterans in Cawston, on the West Bench near Penticton, at Lakeview Heights across the Lake from Kelowna, and in Bankhead, Kelowna. In the 1950's, pressurized irrigation systems were built.

Since the 1970's, the population of the Okanagan-Similkameen has increased dramatically, the greatest increase coming in the past two or three years. In twenty years, it has almost doubled, from 126,970 to about 222,000.

Orchard lands are particularly at risk since, along with urban settlements, they are in the valley bottoms where suitable land and water are available. Prices for orchard land have been high since the turn of the century, relative to other agricultural lands. Current competition for land is keeping the prices at levels few orchardists can afford and which average returns do not warrant. The result is increased pressure to have these lands converted to urban development.

The existence of the ALR has prevented the loss of much good orchard land, and widespread public support for the protection of agricultural lands in the Southern Interior is encouraging. Support alone, however, will not solve the very serious problems of competing uses on a small and fragile land and water base.

Given that land and water are fundamental to a successful tree fruit industry in the Southern Interior, this paper provides a basis for discussion of the issues related to these resources.

The Okanagan Valley Tree Fruit Authority hopes that this document will challenge all participants in such discussions to work cooperatively towards strategic solutions. This is critical to the successful revitalization of the tree fruit industry itself, and also to the overall health of the environment, economy, and living conditions in the region.

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1.0 Introduction And Background To The Issues

This discussion paper outlines the complex issues associated with the land and water use environment in which the orchardist operates. The availability of suitable land and water as basic requirements for an economically and environmentally sustainable tree fruit industry is a priority concern of the Okanagan Valley Tree Fruit Authority (OVTFA).

The tree fruit industry relies upon + 27,000 acs. of unique, climatically suitable land and a critical quantity and quality of irrigation water required in order to maintain tree fruit production. In response to growing public awareness and sensitivity, there is a need for more effective communication and understanding of the complex issues associated with these requirements.

While much of the public debate surrounding agriculture in recent years has centered around the preservation of suitable lands for food production, it is also important to recognize the role of agriculture as part of the rural land use mosaic. Obviously, the tree fruit industry produces high value food products for local, provincial, national and international markets. However, land devoted to tree fruit production also contributes to other economic activity, including tourism; comprises a significant component of the stock of open space and provides an opportunity for a rural lifestyle in proximity to urban amenities.

Fruitlands are under pressure due to intensified demands of competing land and water users. This is further complicated by the fact that the tree fruit industry must operate within an ever-changing maze of government regulation related to land and water use.

If the tree fruit industry is to continue as a vibrant part of the economic landscape and lifestyle diversity of the province, the critical issues associated with land and water use must be clearly understood by all of the stakeholders and cooperative actions must be taken to address them.

2.0 Land And Water Use Competition

Competing and Compatible Land Uses

The competition for suitable land and water to grow tree fruits is intensifying because the same resources are in growing demand for alternate uses. The climatic characteristics that are so important to tree fruit production also offer attractive residential and recreational environments, as well as providing for other rural uses, such as wildlife habitat. These competing uses impact both directly and indirectly on the lands suitable for tree fruit production.

Urban Uses (Residential, Industrial and Commercial)

The relationship between adjacent urban and agricultural communities is a complex one. While there are benefits that accrue to both, the negative impacts are predominantly borne by the agricultural community.

From the perspective of the urban community, the presence of orchards on the urban edge offers some unique opportunities. Orchards are a significant contributor to the esthetics of the rural landscape, with a special character that all residents can share and enjoy. Urban residents located near fruit-producing areas also have the advantage not only of buying fresh produce but also learning how it is produced and processed.

Similarly, those in the business of tree fruit production enjoy some benefits of close association with the urban community, such as quick transportation to urban markets, access to cultural and sport activities, and the opportunity to combine on-orchard employment with other vocational pursuits.

Unfortunately, however, there are also significant adverse effects of urbanization on the tree fruit industry. They go beyond the actual loss of productive farmland through conversion to urban uses. Once incompatible land uses locate in a fruit producing area, the "urban shadow effect" exerts additional pressure upon remaining orchardists.

Orchardists located on the urban edge are often caught in a "Catch 22" situation. Most of them want to keep producing fruit and living a rural or semi-rural lifestyle. However, as surrounding lands are converted to urban uses, they find it harder to carry out normal orchard management practices and resist the temptation to capitalize on the higher land values associated with non-agricultural use potential.

As the number of orchards decline and the fruit-producing community begins to disintegrate, an attitude emerges that hurries the process along. Uncertainty takes its toll as the psychology of expectation of further use conversion spreads throughout the community. Inevitably, orchard owners and operators begin to cut back on the type of investment in capital and labour that the long-term commitment to tree fruit production demands.

The key issues related to residential, industrial and commercial uses include:

- the **direct loss of lands** suitable for tree fruit production (a unique and scarce resource, both provincially and nationally)
- **increased land prices** due to psychology of expected use conversion, with resultant decline in investment in orchard capital improvements
- **people conflicts,** including complaints by non-orchard residents about noise, smell and dust (e.g. orchard spraying) associated with normal orchard management practices
- increased **competition for water** between domestic and irrigation water users
- **urban traffic interfering** with the movement of orchard vehicles and equipment
- impact of industrial activity on **air quality**
- increased orchard **trespass and vandalism**
- **reduced viability of the agricultural service sector** as the number of orchards and orchardists falls below the critical number

Transportation And Utility Corridors

An estimated 2-5% of the Agricultural Land Reserve in tree fruit producing areas is already taken up by existing or proposed rights-of-way for linear developments, such as highways, railways, hydro transmission lines and pipelines. Pressures for these uses can be expected to increase.

The relationship between a linear development and orchard use becomes more complex if more than one type of linear development is involved; for example, a pipeline and a highway. Development impact can be very site and time specific depending upon density of orchard plantings, level of orchard management and the season. Some impacts occur only during construction; others, a few years later; and some may have a permanent, long-term effect on the orchard production unit.

The key issues related to transportation and utility corridors include:

- **direct loss of lands** suitable for tree fruit production
- production unit **severance,** parcel shape **alteration** and parcel **size reduction** due to linear developments
- **interference** with traditional rural community transportation patterns in the movement to and from farm services centers and packing and processing locations
- **management implications of changed access** to various parts of the orchard production unit as a result of highway or other linear development
- **reduced safety and loss of time** in using heavy volume, high speed highways to move orchard equipment and produce and to access several parcels of production units
- increased **pressure for urban use conversion,** increased **land values** and increased **trespass and vandalism** arising from improved access and/or new utilities **weed infestation** from linear rights-of-way
- **interference** of hydro transmission lines **with intensive irrigation management,** particularly in high density orchards
- **long-term safety concerns** with the subsequent use of high-pressure gas pipeline rights-of-way for fruit production and building locations

Tourism and Recreation Uses

In many fruit growing areas, tourism is a rapidly expanding industry. The range and quality of tourism and recreation opportunity are significantly enhanced by the presence of the tree fruit industry. The orchard landscape plays a substantial role in shaping the attraction of these scenic valleys. In a society where open space has become a valued commodity, orchards provide an esthetically pleasing setting for tourism and recreation activities (e.g. bus and car touring, walking and biking). The business of fruit production and processing itself can be of educational interest to tourists.

For the tree fruit industry, however, tourism is a two-edged sword. On the one hand, tourism can be a complementary and compatible use that can contribute to the long-term stability of the tree fruit industry.

On the other hand, the introduction of urban-oriented tourism and recreation facilities within or immediately adjacent to lands in tree fruit production can have negative impacts similar to urban and transportation uses.

The key issue related to tourism and recreation is:

- **the lack of understanding of the close relationship between tourism and the tree fruit industry, a lack of coordination and cooperation in planning for both**

Wildlife Habitat

The interface between tree fruit production and wildlife habitat, particularly for wild ungulate species, has long been an area of significant land use conflict. Increased orchard density, combined with increased public concern for habitat protection, has heightened tension over land use.

The key issues related to wildlife uses include:

- **lack of public understanding and acceptance of responsibility** regarding wildlife and habitat
- **displacement of habitat by residential use** which impacts on orchards as a habitat component replacement
- **impact of increased spring and summer range** at high elevations resulting from forest harvesting and increased demand for valley bottom winter range
- **lack of control of deer populations** on the urban edge and associated with rural residential use
- **need for interagency cooperation** in addressing habitat-orchard issues
- **lack of interface management** techniques and sharing of responsibility

Competing Water Uses

The availability of irrigation water is critical to survival of the tree fruit industry. Strong competition for scarce water resources can be expected to intensify, particularly on the urban edge.

Water Quality/Quantity Issues

Historically in water-scarce regions of North America irrigated agriculture has eventually given way to urban uses or functioned with a reduced share of the available water.

At the present time, approximately 21,000 acs. of tree fruits are being irrigated through drip/trickle and sprinkler systems within the Okanagan Valley Tree Fruit Authority area. According to the Okanagan Basin Implementation Agreement of 1974, for example, under good water management, there should be enough water in the basin to supply all projected withdrawals, including irrigated tree fruit production, and still meet urban, fishery and recreation requirements in the main valley lakes and in the tributary sub-basins. However, because the supply of water is limited but the demand seems to be ever increasing, it is anticipated that the water supply organizations and regulatory authorities will be hard-pressed to meet the water requirements for irrigated tree fruit production in the future.

Key issues with respect to water quantity include:

- lack of recognition that continued, **assured irrigation water volumes are critical** to the survival of tree fruit production; too often, irrigated tree fruit production and irrigated agriculture in general is perceived as a lower priority scarce water resource user
- **increasing number of non-orchardists involved** in irrigation water supply organizations, with the result that decisions tend to serve predominantly domestic use interests
- **late season irrigation water requirements** when flow needed for other requirements (e.g.. fish habitat)
- need for **enhanced on-orchard** and irrigation system **water conservation** techniques
- likely future need for further **upland water storage options**
- effects of **over utilization** upon **groundwater** resources

Key issues with respect to water quality include:

- **public concern with water contamination** from nutrient loading through application of fertilizers, pesticides, and herbicide on fruitlands
- need for **codes of practice** for maintaining water quality
- **use of wastewater effluent** for irrigation purposes
- impact upon irrigation water quality of upper elevation **change in watershed use** (e.g. timber harvesting)

Cross Border Use Considerations

Although there are no legal obligations regarding minimum trans border water flows (except freshet runoff) under International Joint Commission agreement or with reference to the Okanagan Basin Implementation Agreement, several issues impact on irrigation water supply for tree fruit production in the Okanagan and Similkameen watersheds.

The Boundary Water Treaty of 1909 sets the precedent for cooperative efforts to recognize water license priorities on both sides of the border, including providing grievance procedures. Within this international cooperative setting, balancing water requirements to serve both Canadian and American needs particularly during drought conditions, is indeed a challenge.

Key issues associated with cross border water use include:

- **obligations by agreement** with respect to contingency plans **under prolonged drought conditions**
- **increased requirements for irrigation water** outside the normal irrigation season (may need legislation changes)
- **increased requirement for water storage** facilities as a result of any new irrigated tree fruit development
- **achieving a balance** with other water users (tourism, lakeside residential), regarding flood control and irrigation system requirements
- U.S. **priority for sockeye salmon habitat** seasonal water requirements

The Land And Water Use Jurisdiction Maze

Orchardists and their organizations (e.g. irrigation districts and fruit producers' associations) are faced with an increasingly complex government organization structure.

The following are the main land and water use-related government agencies whose legislation regulations and policies directly or indirectly impact upon the tree fruit orchardists and their industry.

International

- International Joint Commission
  (water use planning and allocation)

Federal

- Agriculture Canada
  (research and resource economics)
- Environment Canada
  (land and water inventory and regulations)
- Fisheries and Oceans Canada
  (fish habitat)

Provincial

- Ministry of Agriculture, Fisheries and Food
  (land management, extension services, soil and water conservation)
- Agricultural Land Commission
  (land use regulation and agricultural land protection)
- Ministry of Environment, Lands and Parks
  (water allocation and management, waste management, fish and wildlife habitat management, Crown Land use administration and tenure)
- Ministry of Tourism
  (land use interrelationships)
- Ministry of Forests
  (watershed land use and management)
- Ministry of Aboriginal Affairs
  (land and water issues associated with aboriginal community interests)
- Ministry ofAttorney General
  (land ownership registry and other associated legal issues)
- Ministry of Municipal Affairs, Recreation and Housing
  (integration of local and regional government policies; land use planning, zoning, water supply organization)
- BC Commission on Resources and Environment
  (land and water use planning framework)
- Okanagan Valley Tree Fruit Authority
  (land and water use issues associated with tree fruit production)

Regional and Local Government

- Municipalities
  (land use planning, zoning subdivision control and water distribution)

- Regional Districts
  (land use planning, zoning, subdivision control)

- Okanagan Water Basin Board
  (regional water use planning and allocation consultation)

- Irrigation and Improvement Districts
  (water distribution and allocation)

Governments have not always responded to the land and water priorities of the tree fruit industry in a consistent and integrated manner.

Many of the above-listed agencies of government and others have legislation, policies and programs that are in direct conflict with the land and water needs of tree fruit production and with each other. For example, Federal incentive programs have stimulated competing residential, commercial and industrial demands for land and water in tree fruit producing areas. At the same time, other federal programs have supported research, tree fruit production infrastructure, and income stabilization programs to promote the long term well-being of the tree fruit industry.

Key land and water use jurisdiction issues include:

- within tree fruit-producing areas, the need for **consistent, integrated land use planning processes** in addition to **zoning** and **land and water use regulations** that are coordinated amongst all levels of government
- **lack of a single management jurisdiction** for water in the Okanagan Basin
- lack of consideration of **appropriate land use designations** that respect rural values

3.0 Land Tenure and Values

Associated with the often intense competition for land and water suitable for tree fruit production are many other issues that affect the long term well being of commercial orchards.

Parcel Size

While the average size of a commercial orchard is often regarded as about 20 acres, historical subdivision within the fruitlands has resulted in a significant number of smaller parcels. Some argue that smaller parcels function as building blocks for commercial orchards and that, to a certain density, smaller parcels and non-farm residents in fruit producing areas can be beneficial. On the other hand, smaller parcels can have a negative impact on potential commercial tree fruit production units.

Key issues related to parcel size include:

- **conversion of small parcels** of land highly suitable for fruit growing to estate and rural residential use or to hobby farms associated with other agricultural enterprises (e.g. horses)
- **non-commercial fruit producers on small parcels dominating land and water use decisions** within commercial fruit producing communities
- **increased cost** of managing commercial orchards that comprise **several small parcels**
- **reluctance of owners** of small parcels to invest in long-term capital improvements (e.g. orchard renovation) on lands that are often the best suited for such use; commercial tree fruit production is then forced to locate on less suitable lands
- **higher land prices of smaller parcels** in tree fruit production due to the potential for alternate rural uses
- need for specific policy and mechanism to **encourage consolidation of small parcels** of land that is highly suitable for fruit growing

Land Tenure

Due to the long-term commitment that must be taken in the fruit production business, security of land tenure is critical. That is, the orchardist must have enough security in a land base to provide the time opportunity for return on that business investment. Because of the dominance of smaller parcel sizes, it is common that an orchard includes number of legal parcels, often under a variety of tenure (owned, leased or short term rental).

Key issues related to land tenure include:

- **Inadequate terms** for lease and rental tenure, which results in a lack of commitment to capital investment and to soil and water conservation
- **difficulty in transferring** fruitland from one generation to the next
- **complexity of documentation** needed to effect secure land tenure
- **reduced opportunity** for prospective fruit producers **(new entrants)** due to complexity of assembling sufficient land under various tenures

Commercial Orchard Unit Fragmentation

The subdivision or separation of legal parcels under one commercial management occurs for any number of reasons, from financial stress, urban edge location to construction of public transportation and utility corridors.

The key issues related to fragmentation include:

- **Inefficiency and increased cost of managing components** of a fragmented commercial orchard, in terms of irrigation water supply, equipment transport, servicing, and product transportation
- **uncertainty and instability,** resulting in increased probability of land use conversion of fragmented parcels within orchard units, particularly if they are under lease or rental tenure

Cost of Land and Impact of Speculation

Land speculation at the urban edge occurs in response to the perceived probability of conversion to uses other than tree fruit production. The high cost of land suitable for fruit growing cannot be justified on the basis of the economics of tree fruit production alone.

The speculative market is extremely sensitive to the perceived impermanence of provincial, regional and local land use planning and agricultural zoning regulations. This is heightened by the current general lack of confidence in the future of the fruit-growing industry.

Key issues related to land cost and land speculation include:

- **lack of strong and consistent provincial, regional and local government regulations** that demonstrate a long term commitment to protecting the scarce fruitlands resource
- **impacts of increased ownership of fruitlands by non-orchardists**
- **differences in urban and rural land values** and resulting impact on land use change
- **inability of orchardists, particularly new orchardists, to pay non-agricultural prices for fruitlands.** Even if purchased, there is the added risk of investing in orchard renovations on lands that a grower may not be able to afford to keep in production
- **limited market** for commercial orchards

4.0 Orchard Management Practices

Significant changes are taking place in orchard management practices as a result of environmental considerations, land cost, and other economic factors. codes of orchard management practice are now being developed, with an emphasis on water and soil conservation.

Environmental Issues

The public is expressing increasing concern about potential environmental impact. As with other agricultural sectors this concern may well reflect a lack of communication between orchardists and their rural neighbours, urban consumers and the public at large.

The key environmental issues include:

- **soil and water conservation**
- **application of pesticides** and herbicides, including noise and odour issues
- **potential use of wastewater** for irrigation of orchards
- **protection of** fish and wildlife habitat
- **nuisance complaints** and attempts to restrict or eliminate specific orchard management practices that are perceived to be offensive by neighbours
- **lack of well defined buffer areas** between non-orchard development and commercial orchards
- **lack of public awareness and understanding** regarding standards of environmentally sensitive orchard management practices.

Right-To-Farm

Along the extensive boundary between expanding urban uses and commercial tree fruit production it is becoming increasingly difficult for orchardists to maintain compatibility with urban and suburban neighbours. In many areas of North America, right-to-farm legislation is being considered or has been implemented to protect the existing agricultural community from unreasonable complaints from adjacent neighbours.

Key issues on right-to-farm include:

- **inadequate provincial right-to-farm legislation** that does not protect orchardists from nuisance claims when normal orchard management practices are being carried out
- **inadequate notification of orchard management practices** to prospective home buyers of land adjacent to orchards or potential orchards
- **lack of dispute mediation mechanism process** between orchardists and adjacent users
- local government **bylaws not in conformity** with right-to-farm.

Sustainability and Viability

The direct relationships between stress on land and water resources and sustainability and viability of the tree fruit industry are of increasing concern to producers as well as society in general. While land and water issues are critical it makes little sense to save fruitlands if we do not have orchardists who are prepared to produce fruit commodities.

Sustainability and viability pull together issues of orchard land and water use environment with the economic realities of fruit production costs, infrastructure, marketing and managerial capabilities of producers.

Key sustainability and viability issues include:

- the need to **recognize** that **economic viability** is central to sustainability
- the need to **research and evaluate sustainability approaches** on an ongoing basis, including new commodity opportunities
- the need to develop **comprehensive integrated agricultural zoning** at the municipal and provincial levels
- the need to recognize that there are **unique specific land and water requirements that are critical** to tree fruit industry sustainability (e.g. irrigation water supply) that may not affect other agricultural commodities
- the need to **increase public understanding** of the issues associated with tree fruit industry sustainability

References

American Farmland Trust. Undated. Saving the Farm - A Handbook For Conserving Agricultural Land. Washington

Beesley, Ken B. and Lorne H. Russwurm. 1981. The Rural-Urban Fringe: Canadian Perspectives. York University-Atkinson College. Vancouver/Waterloo

B.C. Agricultural Land Commission. 1992. Draft Landscaped Buffer Specifications. Burnaby

Cocklin, Chris, Barry Smit, and Tom Johnston. 1987. Demands on Rural Lands - Planning for Resource Use. Westview Special Studies Westview Press. Boulder and London

Day, Dr. J.C. and J.A. Affum. 1990. Toward Sustainable Water Planning and Management in British Columbia. BC Round Table on the Environment and the Economy. Victoria

Edwards, Clive A., Rattan Lal, Patrick Madden, Robert H. Miller and Gar House. 1990. Sustainable Agricultural Systems. Soil and Water Conservation Socity. Iowa

Environment Canada. 1985. Okanagan Fruitlands: Land-Use Change Dynamics and the Impact of Federal Programs. Lands Directorate. Ottawa

Gibson, Kathleen, Eva Durance, Stuart Hill, Gary Runka. 1991. Environmental Profile of the Okanagan-Similkameen Region. Okanagan Valley Tree Fruit Authority. Summerland

Hoffman, D.W.. 1982. "Saving Farmland, a Canadian Program". Geo Journal 6.6. University of Waterloo. Ontario

Holmes Powell & Dendy Ltd. 1992. Creston Tree Fruit Industry Development Study. Okanagan Valley Tree Fruit Authority. Summerland

Klohn Leonoff Ltd. 1992. Delta Agricultural Study. ARDSA. Vancouver

Kluckner, Michael. 1991. Paving Paradise - Is British Columbia Losing Its Heritage?. White Cap Books. Vancouver/Toronto

Lapping, Mark B., George E. Penfold and Susan Macpherson. 1983. "Right-to-farm laws: Do They Resolve Land Use Conflicts?". Journal of Soil and Water Conservation Vol. 38 No. 6. Guelph

Lisansky, Judith. 1986. "Farming in an Urbanizing Environment: Agricultural Land Use Conflicts and Right to Farm". Human Organization, Vol. 45. No. 4 Winter. New Jersey

Lockeretz, William. 1987. Sustaining Agriculture Near Cities. Soil and Water Conservation Society. Iowa

Lopez, Rigoberto A, Adesoji O. Adelaja, and Margaret S. Andrews. 1988. The Effects of Suburbanization on Agriculture. New Jersey

Lusztig, Peter. 1990. Report of the Commission of Inquiry - British Columbia Tree Fruit Industry. Vancouver

Neilsen, G.H., D.S. Stevenson, J.J. Fitspatrick and C.H. Brownlee. 1990. Soil Pollution in British Columbia - Wastewater Irrigation of Orchards. B.C. Land Resource Science Lead Committee. Vancouver

Okanagan Basin Implementation Board. 1982. Report on the Okanagan Basin Implementation Agreement. Okanagan Valley

Pease, James R.. 1991. "Farm Size and Land-Use Policy: An Oregon Case Study". Evnvironmental Management Vol. 15, No. 3. Oregon

Runka, G. Gary Land Sense Ltd. 1990. Choosing Our Future Greater Vancouver Agricultural Overview. Greater Vancouver Regional District. Burnaby

Tera Environmental Consultants Ltd. 1983. Opportunities and Risks Presented To Agriculture By Linear Developments, Project No. 271315. Ministry of Agriculture and Food. Vancouver